NATURAL RESOURCES CONSERVATION SERVICE

CONSERVATION PRACTICE STANDARD

Pond

(Number)

Code 378

DEFINITION

A water impoundment made by constructing a dam or an embankment or by excavating a pit or dugout.

In this standard, ponds constructed by the first method are referred to as embankment ponds, and those constructed by the second method are referred to as excavated ponds. Ponds constructed by both the excavation and the embankment methods are classified as embankment ponds if the depth of water impounded against the embankment at spillway elevation is 3 feet or more.

PURPOSES

To provide water for livestock, fish and wildlife, recreation, fire control, and other related uses, and to maintain or improve water quality.

CONDITIONS WHERE PRACTICE APPLIES

This standard establishes the minimum acceptable criteria for the design and construction of ponds if:

1. Failure of the dam will not result in loss of life; or damage to homes, commercial or industrial buildings, main highways, or railroads; or in interruption of the use or service of public utilities.

2. The product of the storage times the effective height of the dam is less than 3,000. Storage is the volume, in acre-feet, in the reservoir below the elevation of the crest of the auxiliary spillway or the top of fill if there is no auxiliary spillway. The effective height of the dam is the difference in elevation, in feet, between the auxiliary spillway crest and the lowest point in the cross section taken along the centerline of the dam. If there is no auxiliary spillway, the top of the dam is the upper limit.

3. The effective height of the dam is 35 feet or less, and the dam is hazard class (a). See National Engineering Manual 520.23 (b) for documentation of hazard classification.

Site conditions. Site conditions shall be such that runoff from the design storm can be safely passed through (1) a natural or constructed auxiliary spillway, (2) a combination of a principal spillway and an auxiliary spillway, or (3) a principal spillway.

Drainage area. The drainage area above the pond must be protected against erosion to the extent that expected sedimentation will not shorten the planned effective life of the structure.

The drainage area shall be large enough so that surface runoff and ground water flow will maintain an adequate supply of water in the pond. The ratio of pond area to drainage area should fall within the following guidelines:

(a) For slowly permeable soils (Hydrologic Group C & D soils) having slopes greater than seven (7) percent – not less than 1:4 or more than 1:20.

(b) For moderately permeable soils (Hydrologic Group B & C soils) and slowly

permeable soils with less than seven (7) percent slopes – not less than 1:6 or more than 1:25.

(c) For permeable soils (Hydrologic Group A soils) – not less than 1:10 or more than 1:30.

The water quality shall be suitable for its intended use. Runoff water from barnyards, feedlots, septic tanks, barn drains, or other sources of contamination shall be diverted so as not to flow into ponds to be used for livestock water supply, fish and wildlife, or recreation.

Reservoir area. The topography and soils of the site shall permit storage of water at a depth and volume that ensure a dependable supply, considering beneficial use, sedimentation, season of use, and evaporation and seepage losses. If surface runoff is the primary source of water for a pond, the soils shall be impervious enough to prevent excessive seepage losses or shall be of a type that sealing is practicable.

CRITERIA

General Criteria for Embankment and Excavated Ponds

The design, construction and operation of the pond shall comply with all federal, state and local laws, rules and regulations.

Minimum depth shall be 8 feet over at least 25 percent of pond or pit area at permanent water level, or where underlying rock prevents excavation to that depth, a minimum of 6 feet over at least 50 percent of the area.

When the primary purpose is for fish production, at least 75 percent of the shoreline shall be steepened to a slope of three horizontal to one vertical to a depth of 3 feet below permanent pool level. Ponds or pits primarily for fish production shall have a minimum surface area of not less than 0.25 acre when stocked with a single species or a minimum surface area of 0.5 acre when stocked with two or more species.

All others shall have a surface area adequate for the intended purpose, with a minimum surface area of 0.15 acre for excavated ponds and 0.25 acre for embankment ponds.

Vegetation. A protective cover of vegetation shall be established on all exposed surfaces of the embankment, spillway, borrow and spoil areas and to a minimum of 50 feet on all sides of pond and 100 feet upstream of the pool area. Open areas to be vegetated will be limed, fertilized, seeded and mulched according to the construction specification. No woody vegetation shall be planted on or within 25 feet of the embankment or spillway.

Fencing. When embankment ponds are used for livestock water, the entire fill, spillways and pond area shall be fenced to exclude livestock. Fencing shall be a minimum of 30 feet from all sides of the pond and a minimum of 50 feet upstream of the pool area. Flash grazing is allowed only with a grazing plan. Watering facilities for stock shall be provided outside the fenced area. All fencing shall be in accordance with the Field Office Technical Guide (FOTG) Standard (382) Fence.

Additional Criteria for Embankment Ponds

Foundation and soil investigation. The foundation on which a dam is to be placed shall have sufficient bearing strength to support the dam without excessive consolidation. Investigation shall be made of the fill site, pool area, and borrow areas to determine if the requirements listed for Foundation Cutoff can be met. The investigation shall be in sufficient detail to determine that adequate borrow is available, that the auxiliary spillway can be excavated as planned, that the mechanical spillway foundation is suitable, and the pond can maintain normal pool level. A more extensive investigation must be done in karst areas. Soil materials shall be classified using the Unified Soil Classification System.

Foundation cutoff. A cutoff of relatively impervious material shall be provided under the dam. The cutoff shall be located at or upstream from the centerline of the dam. It shall extend up the abutments as required and be deep enough (2 foot minimum) to extend into a relatively impervious layer or provide for a stable dam when combined with seepage control. Where the possibility of subsurface drains exist, the cutoff shall be deep enough to intercept them. The cut off trench shall have an 8-foot minimum bottom

width to accommodate the equipment used for excavation, backfill, and compaction operations. Side slopes shall not be steeper than one horizontal to one vertical.

The most impervious material available shall be used to backfill the cutoff trench and to construct the core of the dam.

Seepage control. Seepage control is to be included if (1) pervious layers are not intercepted by the cutoff, (2) seepage may create swamping downstream, (3) such control is needed to insure a stable embankment, or (4) special problems require drainage for a stable dam. Seepage may be controlled by (1) foundation, abutment, or embankment drains; (2) reservoir blanketing or sealing; or (3) a combination of these measures.

Earth embankment. The minimum top width for a dam is shown in Table 1. If the embankment top is to be used as a public road, the minimum width shall be 16 feet for one-way traffic and 26 feet for two-way traffic. Guardrails or other safety measures shall be used where necessary and shall meet the requirements of the responsible road authority.

Table 1. Minimum top width for dams.

Total Height of Embankment (feet)	Top Width (feet)
<10	6
10 to <15	8
15 to <20	10
20 to <25	12
25 to <35	14

The combined upstream and downstream side slopes of the settled embankments shall not be less than five horizontal to one vertical with the upstream slope never steeper than two and one-half horizontal to one vertical, and the downstream slope never steeper than two horizontal to one vertical. Slopes shall be designed to be stable, even if flatter side slopes and/or berms are required. The downstream slope shall be two and one-half horizontal to one vertical or flatter, if the dam is to be mowed.

If needed to protect the slopes of the dam, special measures, such as berms, rock riprap, sand-gravel, soil cement, or special vegetation, shall be provided (NRCS Technical Releases 56 and 69).

The minimum elevation of the top of the settled embankment shall be 1 foot above the water surface in the reservoir with the auxiliary spillway flowing at design depth. The minimum difference in elevation between the crest of the auxiliary spillway and the settled top of the dam shall be 2 feet for all dams having more than a 20-acre drainage area or more than 20 feet in effective height.

The design height of the dam shall be increased by the amount needed to insure that after settlement the height of the dam equals or exceeds the design height. This increase shall not be less than 5 percent, except where detailed soil testing and laboratory analyses show a lesser amount is adequate.

Principal spillway. A pipe conduit, with needed appurtenances, shall be placed under or through the dam except:

1) Where rock, concrete, or other type of mechanical spillways are used;

2) For drainage areas less than 10 acres not fed by springs or seep;

3) Where the rate and duration of flow can be safely handled by a vegetated or earth spillway.

When design discharge of the principal spillway is considered in calculating peak outflow through the auxiliary spillway, the crest elevation of the inlet shall be such that the full flow will be generated in the conduit before there is discharge through the auxiliary spillway. The inlets and outlets shall be designed to function satisfactorily for the full range of flow and hydraulic head anticipated.

The capacity of the pipe conduit shall be adequate to discharge long-duration, continuous, or frequent flows without flow through the auxiliary spillways. The minimum diameter of pipe, minimum frequency design and detention

storage shall be determined from Table 2 for the principal spillway.

Pipe conduits under or through the dam shall meet the following requirements. The pipe shall be capable of withstanding external loading without yielding, buckling, or cracking. Flexible pipe strength shall not be less than that necessary to support the design load with a maximum of 5 percent deflection. Pipe strength shall not be less than that of the grades indicated in Table 3 or 4 for plastic pipe and in Table 5 for corrugated aluminum, aluminized corrugated steel and galvanized steel pipe. The inlets and outlets shall be structurally sound and made of materials compatible with those of the pipe. All pipe joints shall be made watertight by the use of coupling, gaskets, caulking, or by welding.

For dams 20 feet or less in effective height, acceptable pipe materials are cast or ductile iron, steel, corrugated steel or aluminum, concrete, plastic, and cast-in-place reinforced concrete. Concrete pipe shall be laid in a concrete bedding. Plastic pipe that will be exposed to direct sunlight shall be made of ultraviolet-resistant materials and protected by coating or shielding, or provisions for replacement should be made as necessary. Connections of plastic pipe to less flexible pipe or structure must be designed to avoid stress concentrations that could rupture the plastic.

For dams more than 20 feet in effective height, conduits shall be plastic, reinforced concrete, cast in-place reinforced concrete, ductile iron, corrugated steel or aluminum, or welded steel pipe. Pipe shall be watertight. The joints between sections of pipe shall be designed to remain watertight after joint elongation caused by foundation consolidation. Concrete pipe shall have concrete bedding or a concrete cradle. Cantilever outlet sections, if used, shall be designed to withstand the cantilever load. Pipe supports shall be provided when needed. Other suitable devices such as a Saint Anthony Fall stilling basin (S.A.F.), stilling basin, or an impact basin may be used to provide a safe outlet. Protective coatings of fiber bonded, asphalt coated, or vinyl coating on galvanized corrugated metal pipe, or coal tar enamel on welded steel pipe shall be provided in areas that have a history of pipe corrosion, or where the saturated soil resistivity is less than 4,000 ohms-cm, or where soil pH is lower than 5.

Table 2

Minimum requirements for structures located in predominantly rural or agricultural areas and incorporating water detention and/or retention storage in their design where (1) the hazard class of the structure is "a", (2) the product of the storage[1] times the effective height of dam[2] is less than 3000, and (3) the effective height of dam[2] is 35 feet or less.

<table>
<tr><th>Drainage Area</th><th>Effective Height of Dam 2/</th><th>Storage 1/</th><th>Principal Spillway (24-hour Storm AMCII)</th><th>Auxiliary Spillway (24 hour Storm) 4/</th><th>Top of Settled Fill</th></tr>
<tr><td>10 acres or less without Conduit 3/</td><td>Less than 20 feet</td><td rowspan="4">Less than 50 acre feet</td><td>See Note 3</td><td rowspan="2">Route Q_{10} 6/</td><td rowspan="4">Minimum of 1 foot freeboard above the Hp value for the auxiliary spillway, but at least 2 feet above the crest of the auxiliary spillway for all dams having more than 20 acres drainage area or more than 20 feet in effective height. 9/</td></tr>
<tr><td rowspan="2">20 acres or less 5/</td><td>Less than 20 feet</td><td>1.0" Detention Storage (minimum) or Route Q_2 8/</td></tr>
<tr><td>20 feet or more</td><td>1.5" Detention Storage 7/ minimum or Q Route 5 yr. freq. 8/</td><td>Route Q_{25} 6/</td></tr>
<tr><td>Over 20 acres 5/</td><td></td><td></td></tr>
<tr><td>ALL OTHERS 5/</td><td></td><td></td><td>2.0" Detention Storage 7/ (minimum) or Q Route 10 yr. freq. 8/</td><td>Route Q_{50} 6/</td></tr>
</table>

1/ Storage is defined in "Conditions Where Practice Applies".

2/ Effective height of dam is defined in "Conditions Where Practice Applies".

3/ Where the pond is spring fed or other source of steady base flow, a pipe shall be installed with a capacity at least equal to the maximum spring or base flow.

4/ Auxiliary spillway crest shall be set above the storage requirements of the principal spillway, but not lower than the elevation at which the principal spillway conduit flows full. The crest of the auxiliary spillway shall be at least 0.5 feet above the crest of the principal spillway for less than 20 acres drainage area and at least 1.0 feet above the crest of the principal spillway for greater than 20 acres drainage area.

5/ A principal spillway conduit is required. Minimum pipe diameter shall be 4 inches smooth pipe or 6 inches corrugated metal pipe.

6/ Flow through the principal spillway shall not be included if the pipe diameter is less than 10 inches.

7/ Minimum pipe diameter shall be 10 inches.

8/ Storage may be determined by short cut methods on Engineering Field Handbook pages 11.55a, 11.55b, and 11.55c or Hydro-yardage computer program.

9/ Where IDNR approval is required, additional freeboard may be required. Consult the NRCS State Conservation Engineer for instructions.

Conservation practice standards are reviewed periodically, and updated if needed. To obtain the current version of this standard, contact the Natural Resources Conservation Service.

Specifications in Tables 3, 4, and 5 are to be followed for polyvinyl chloride (PVC), high density polyethylene (HDPE), steel, and aluminum pipe.

Cathodic protection is to be provided for coated welded steel and galvanized corrugated metal pipe where soil and resistivity studies indicate that the pipe needs a protective coating, and where the need and importance of the structure warrant additional protection and longevity. If cathodic protection is not provided for in the original design and installation, electrical continuity in the form of join-bridging straps should be considered on pipe that have protective coatings. Cathodic protection shall be added later if monitoring indicates the need.

National NRCS practice standard 430-FF Irrigation Water Conveyance, Pipeline, Steel provides criteria for cathodic protection of welded steel pipe.

When concrete pipe is used for the conduit, concrete shall also be placed around the outside of the riser enclosing the first joint of the conduit.

Risers or inlets for pipe conduits shall be of the same material as the conduit, or of comparable life materials such as reinforced concrete, concrete blocks, concrete culvert pipe, welded steel pipe or corrugated metal pipe. Hooded or canopy inlet may be used in lieu of a riser.

Risers shall have a cross-sectional area at least 1.5 times that of the principal spillway conduit which outlets from it, but not less than 18 inches diameter.

Risers shall have a height adequate to ensure full pipe flow in the barrel. All pipe risers shall have an extra foot of length below the invert of the conduit encased in concrete to the invert of the conduit.

Closed conduit spillways designed for pressure flow must have adequate anti-vortex devices.

To prevent clogging of the conduit, an appropriate trash guard shall be installed at the inlet or riser.

The riser or inlet will be protected from ice and floating debris by a semi-circular berm not less than 4 feet from the riser. No berm is necessary when a hooded or canopy inlet is used but the invert of the inlet shall project one (1) foot vertically above the fill slope.

Table 3. Acceptable PVC pipe for use in earth dams. [1]

Nominal pipe size (inches)	Schedule for standard dimension ratio (SDR)	Maximum depth of fill over pipe (feet)
6 or smaller	SDR 26	10
	Schedule 40	15
	Schedule 80	20
8, 10, 12	SDR 26	10
	Schedule 40	10
	Schedule 80	15

1/ Polyvinyl chloride pipe, PVC 1120 or PVC 1220, that conform to ASTM-D-1785 or ASTM-D-2241.

Table 4. Acceptable HDPE pipe for use in earth dams. [1]

Pipe Values	Maximum height of fill over the top of pipe[2] (feet)
SDR 21-32.5 PS 34-50	10
SDR 17 PS 100	11.5

1/ High density polyethylene pipe, ASTM-D3350 flexural modulus cell class 4 or greater, conforming to ASTM F714 for smooth wall HDPE pipe or AASHTO M-252 or M-294 for double wall HDPE pipe. These materials will typically have standard dimension ratio (SDR) values ranging from 32.5 to 21 or pipe stiffness (PS) values ranging from 34 to 100 psi respectively.

2/ The maximum height of fill over top of the pipe. This is based on 0 degree bedding (line support at the invert only). Backfill is assumed to be at 85 to 95% of maximum standard proctor density.

Table 5. Minimum sheet thickness for corrugated steel pipe (2-2/3 in x ½ in corrugations). [1,2]

Diameter of pipe (inches)	Fill height (feet)		
	1 to <15	15 to <20	20 to 25
21 and less	0.064	0.064	0.064
24	0.064	0.064	0.064
30	0.064	0.064	0.079
36	0.079	0.079	0.109
42	0.109	0.109	0.138
48	0.138	0.138	0.138

Minimum sheet thickness (in) of aluminum pipe. [3]

Diameter of pipe (inches)	Fill height (feet)		
	1 to <15	15 to <20	20 to 25
21 and less	0.060	0.060	0.060
24	0.060	0.075	0.105
30	0.075	0.105	0.135
36	0.075	0.105	[4]

1/ Pipe with 6, 8 and 10-inch diameters has 1-1/2 in x ¼ in corrugations.
2/ Conforming to ASTM A760, A762 and A885.

3/ Riveted or helical fabrication, that conforms to ASTM B745 and B790.
4/ Not permitted.

Seepage control along a pipe conduit spillway or pond drain shall be provided in the normal saturation zone. Seepage along pipes extending through the embankment shall be controlled by use of a filter and drainage diaphragm, unless it is determined that antiseep collars will adequately serve the purpose.

The drain is to consist of sand, meeting fine concrete aggregate requirements (at least 15% passing the No. 40 sieve but no more than 10% passing the No. 100 sieve). If unusual soil conditions exist, a special design analysis shall be made.

The drain shall be a minimum of 2 feet thick and extend vertically upward and horizontally at least three times the pipe diameter, and vertically downward at least 18 inches beneath the bedding or cradle. The drain diaphragm shall be located immediately downstream of the cutoff trench, approximately parallel to the centerline of the dam.

The drain shall be outletted at the embankment downstream toe, preferably using a drain backfill envelope continuously along the pipe to where it exits the embankment. Riprap shall be used to cover the drain outlet to protect it from surface erosion.

When anti-seep collars are used in lieu of a drainage diaphragm, they shall have a watertight connection to the pipe. Collar material shall be compatible with pipe materials. Maximum spacing shall be approximately 14 times the minimum projection of the collar measured perpendicular to the pipe, but not more than 25 feet. The first collar shall not be more than 14 feet downstream of the inlet. The antiseep collar(s) shall increase by 15% the seepage path along the pipe.

Where the downstream channel conditions are stable, the pier may be omitted for conduits of 15 inch diameter or less with the outlet invert one (1) to two (2) feet above the stable channel bottom. The outlet section shall be a minimum of 20 feet in length with a four (4) feet to eight (8) feet overhang downstream from the intersection of the flow line of the pipe and the design fill slope.

For conduits larger than 15-inch diameter, conduits with outlets higher than two (2) feet above the grade of the channel bottom or conduits outletting in unstable outlet channels, a cantilever propped outlet or other suitable devices such as a S.A.F. stilling basin, or impact basin will be provided. For cantilevered (propped) outlets, the outlet section of pipe shall be a minimum of 20 feet long, with the prop (or pier) located at or downstream from the intersection of the fill slope and the outlet channel grade. Approximately one-third of the outlet pipe section (minimum of 8 feet) shall be downstream of the pier centerline. A stilling

basin shall be excavated and lined with riprap if necessary to prevent erosion at the outlet.

A pipe with a suitable valve shall be provided to drain the pool area if needed for proper pond management. The principal spillway conduit may be used as a pond drain if it is located where it can perform this function. The drain shall be large enough to draw the pond down 8 feet in 2 weeks (approximately 16 GPM or 0.04 cfs. per A.F. of storage).

Supply pipes through the dam to watering troughs and other appurtenances shall have an inside diameter of not less than 1¼ inches.

Auxiliary spillways. An auxiliary spillway must be provided for each dam, unless the principal spillway is large enough to pass the peak discharge from the routed design hydrograph and the trash that comes to it without overtopping the dam. The following are minimum criteria for acceptable use of closed conduit principal spillway without an auxiliary spillway: a conduit with a cross-sectional area of 3 square feet or more, an inlet that will not clog, and an elbow designed to facilitate the passage of trash.

The minimum capacity of a natural or constructed auxiliary spillway shall be that required to pass the peak flow expected from a design storm of the frequency and duration shown in Table 2.

The auxiliary spillway shall safely pass the peak flow, or the storm runoff shall be routed through the reservoir. The routing shall start either with the water surface at the elevation of the crest of the principal spillway or at the water surface after 10 days' drawdown, whichever is higher. The 10-day drawdown shall be computed from the crest of the auxiliary spillway or from the elevation that would be attained if the entire design storm were impounded, whichever is lower. Auxiliary spillways shall provide for passing the design flow at a safe velocity to a point downstream where the dam will not be endangered.

Constructed auxiliary spillways are open channels that usually consist of an inlet channel, a control section, and an exit channel. They shall be trapezoidal and shall be located in undisturbed or compacted earth. The side slope shall be stable for the material in which the spillway is to be constructed, but not steeper than two horizontal to one vertical except when cut in rock. The minimum auxiliary spillway bottom width shall be 10 feet.

The control section shall be level for a minimum distance of 10 feet. The inlet channel shall be at least the same width as the control section and may be curved to fit existing topography. The grade of the exit channel of a constructed auxiliary spillway shall fall within the range established by discharge requirements and permissible velocities. The constructed exit channel shall be straight and uniform to a point downstream of the toe of the dam.

Structural auxiliary spillway. If chutes or drops are used for principal spillways or auxiliary spillways, they shall be designed according to the principles set forth in the Engineering Field Manual for Conservation Practices and the National Engineering Handbook-Section 5, Hydraulics; Section 11, Drop Spillways; and Section 14, Chute Spillways. The minimum capacity of a structural spillway shall be that required to pass the peak flow expected from a design storm of the frequency and duration shown in Table 2.

Additional Criteria for Excavated Ponds

General. This type of reservoir is generally constructed in flat land areas where an embankment pond is not feasible. The water supply is obtained from underground seepage, high water table, springs, subsurface drains or surface runoff. An adequate water supply which will maintain desired water level in pond must be assured.

Outlet. Provisions shall be made for a pipe and auxiliary spillway if necessary (see Table 2). Runoff flow patterns shall be considered when locating the pit and placing the spoil.

Depth. Depth requirements shall be the same as for embankment ponds, except that if the water supply is derived from seeps or spring flows, the

pit must have a depth of at least 4 feet over 25 percent of the pit area.

Side slopes. Side slopes of excavated ponds shall be stable and shall not be steeper than the minimum side slopes shown in Table 6.

Table 6. Steepest Allowable Side Slopes

Texture	Horizontal:Vertical
Peat and Muck	1:1
Fine Sand	2.5:1
Coarse Sand and Gravel	2:1
Silt Loam or Loam	2:1
Sandy Loam	2:1
Clay Loam or Silty Clay Loam	1.5:1

Inlet protection. If surface water enters the pond in a natural or excavated channel, the side slope of the pond shall be protected against erosion.

Excavated material. The material excavated from the pond shall be placed so that its weight will not endanger the stability of the pond side slopes and so that it will not be washed back into the pond by rainfall. It shall be disposed of in one of the following ways:

1. Uniformly spread to a height that does not exceed 3 feet with the top graded to a continuous slope away from the pond.

2. Uniformly placed or shaped reasonably well with side slopes assuming a natural angle of repose. The excavated material will be placed at a distance equal to the depth of the pond but not less than 12 feet from the edge of the pond.

3. Shaped to a designed form that blends visually with the landscape.

4. Used for low embankment and leveling.

5. Hauled away.

Safety. Ponds and pits can create a safety hazard. Appropriate safety features and devices shall be installed to protect people and animals from accidents such as falling or drowning, if appropriate.

CONSIDERATIONS

Considerations should be given to the use of construction materials, grading practices, vegetation and other site development elements that minimize visual impacts and maintain or supplement existing landscape uses.

Excess excavated material may be used to construct earth fishing piers into the pond and/or nesting islands.

The visual design of ponds should be carefully considered in areas of high public visibility and those associated with recreation. The underlying criterion for all visual design is appropriateness. The shape and form of ponds, excavated material, and plantings are to relate visually to their surroundings and to their function.

The embankment may be shaped to blend with the natural topography. The edge of the pond may be shaped so that it is generally curvilinear rather than rectangular. Excavated material can be shaped so that the final form is smooth, flowing, and fitting to the adjacent landscape rather than angular geometric mounds. If feasible, islands may be added for visual interest and to attract wildlife.

Consider using a trickle tube to keep auxiliary spillways from eroding from wetness when no principal spillway pipe is installed.

PLANS AND SPECIFICATIONS

Plans and specifications for construction of ponds shall be in keeping with this standard and shall describe the requirements for properly installing the practice to achieve its intended purpose.

OPERATION AND MAINTENANCE

An operation and maintenance plan will be developed for the landowner in keeping with this practice standard. At a minimum, the following items shall be addressed:

1. Remove any woody growth from embankments and spillway areas. Keep grasses mowed for better visual inspection.

2. Remove debris and trash from spillways and outlets immediately. Inspect the outlet regularly, especially after storm events.

3. Control burrowing animals. Repair any holes caused by burrowing animals on or near the embankment.

4. Repair any erosion of the embankment.

5. Inspect the embankment for seepage downstream.